MILITARY STREET BRIDGE
(I-94/I-69 Business Loop Bridge)
Military Street over the Black River
City of Port Huron
St. Clair County
Michigan

HAER No. MI-38

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
Northeast Field Area
Chesapeake/Allegheny System Support Office
National Park Service
U.S. Custom House
200 Chestnut Street
Philadelphia, PA 19106

HISTORIC AMERICAN ENGINEERING RECORD

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HAER No. MI-38

Location:	Spanning the Black River at Military Street, Port Huron, St. Clair County, Michigan USGS Port Huron Quadrangle UTM: 17.384160.4758640
Date of Construction:	1912-13
Engineer, Builder	The Strauss Bascule Bridge Company and the Osborne Engineering Company, engineers; the McKenzie Bridge Company and the Detroit Steel & Bridge Company, builders.
Present Owner:	Michigan Department of Transportation, 425 West Ottawa, P.O. Box 30050, Lansing, Michigan 48909
Present Use:	Vehicular and Pedestrian Traffic
Significance:	The Military Street Bridge is the oldest surviving bascule highway bridge in Michigan and is an excellent example of the underneath counterweight trunnion design developed by Joseph B. Strauss, an important twentieth century American bridge engineer.
Project Information:	This documentation was undertaken in June, 1990 in accordance with the Memorandum of Agreement by the Federal Highway Administration, the Michigan Department of Transportation, the State Historic Preservation Officer, and the Advisory Council on Historic Preservation as a mitigative measure prior to the demolition of the bridge. Dr. Charles K. Hyde, Department of History, Wayne State University Detroit, Michigan 48202

PART I: HISTORY OF THE MILITARY STREET BRIDGE

This is the fourth bridge to carry traffic over the Black River in Port Huron. The first was the final link in the military road connecting Detroit with Fort Gratiot, located just north of Port Huron and an important post at the lower end of Lake Huron. Congress authorized the Detroit-Port Huron Military Road, also known as the Fort Gratiot Turnpike in 1827, and the final section, which included the bridge, opened in 1833. Major Henry Whiting of Detroit awarded the contract to John Clarke, manager of the Black River Steam Saw Mill, who in turn subcontracted to a local builder. The wooden bridge was 22 feet wide and 240 feet long, with approaches, and had a 40 foot draw span consisting of two 20-foot leaves raised by windlass.[1]

The 1833 bridge survived until 1854, when a schooner captain deliberately destroyed it. Captain Stockman, operating a schooner owned by the Black River Steam Saw Mill, approached the bridge on a Sunday and signaled for the bridge to open. The two moveable wings became locked together and Alanson Shelley, manager of the sawmill, ordered the captain to remove the bridge as an "obstruction to navigation" and sent carpenters from the sawmill to do the work. The county highway commission tried to sue for the loss of the bridge, but lost the case in the courts.[2]

A massive timber bowstring swing bridge, built in 1857, carried Military Street over the Black River until 1884. Constructed slightly downstream, it was slid on timber runners and placed over the pier on which it pivoted. The bridge was known locally as "the old white bridge," perhaps because it was whitewashed or painted white.[3]

The third bridge on this site was an iron Pratt through truss swing span, built in 1883-84. In its later years, large signs, "You'll Like Port Huron" adorned its portals. The new bridge was knocked off its pier on 9 April 1885, when a spring freshet caused three barges, the Burlington, the Church, and the Allen, to break loose from their moorings. They smashed into each other and into the bridge, which fortunately, was in the open position at the time.[4]

The iron swing span suffered considerable damage over the years from ships on the Black River. In 1903, the tug American Eagle, towing the barge Homer loaded with coal, struck the bridge and ceused aerious demage.[5] Besides the constant threet of a major accident which could close the Black River and Military Street at the same time, the swing span was simply too narrow. It provided two 9-foot sidewalks and an 18-foot roadway, barely wide enough to accommodate the pair of trolley lines that crossed the bridge. In 1905, the City of Port Huron hired two bridge engineers to examine the structure and both reached the same conclusions - the bridge was subject to excessive wear and tear because it was not designed for the trolley and heavy vehicular traffic, plus the combined effects of rust end bumping from vessels had weakened the structure. They recommended replacement.[6] In February 1906, W.W. Phelps, Port Huron's City Engineer, produced plans for a new bridge which would provide a 40-foot roadway and two 10-foot sidewalks, but the City took no ection.[7]

The City of Port Huron could choose among three basic designs for movable bridges - another swing span, which turned 90 degrees on a central pier; a vertical lift bridge, which required expensive machinery to lift the moveable span straight up; or a bascule (counterbalenced draw) bridge. Given the need for a wider bridge and the narrow width of the Black River, enother swing span was never a reeliatic option.[8] Several typas of bescule bridge emerged in the early 1890s, with Chicago es the major center of new designs. The Military Street Bridge is an example of the Strauss bescule desiqn.[9]

Joseph Baerman Strauss (1870-1938) was born in Cincinnati, Ohio and studied engineering subjects at the University of Cincinnati, even though the university did not have a formal degree program in engineering. Strauss graduated in 1892 and worked briefly for the New Jersey Steel and Iron Company and then for the Brackett Bridge Company in Cincinnati. He joined the prestigious bridge engineering firm of Ralph Modjeski in Chicago in 1902. After his suggestion that bridge counterweights be made of concrete instead of cast iron fell on deaf ears, he established his own consulting firm, Joseph B. Strauss and Company.[10]

The new firm's first success was a bridge over the Cayahoga River in Cleveland, completed in 1903. Strauss designed a pinion-connected, parallel-link or "trunnion" system that allowed the use of large counterweights without blocking the bridge proper. He built three variations of this general type - the "Overhead Counterweight," the "Heel Trunnion," end the "Underneath Counterweight" design. The Militery Street Bridge is an exemple of the last type.[11]

The Strauss Bascule Bridge Company of Chicago became the premier engineering firm in the United States specializing in bascule bridges. Strauss designed about 400 bridges altogether and roughly 375 of these were bascules. His work included forty bascule bridges in Panama and one across the Neva River in St. Petersburg, used by the Bolsheviks to capture the Tsar's Winter Palace in October 1917. Strauss is best-known, however, for his pivotal role in the building of the Golden Gate Bridge in San Francisco. He was the chief designer and promoter of this important suspension bridge.[12]

The City of Port Huron proceeded cautiously in having a new Military Street bridge built. In late April 1912, the City Commission awarded a contract to the Osborne Engineering Company of Cleveland to plan and overeee the project. The City invited bids in early July, to be submitted by 10 August 1912, end six firms responded.[13] Before the City announced its decision, one of the losing bidders, James O'Sullivan & Sons Company, claimed that it was the low bidder, by about $2,000. Mayor Bell, however argued that when O'Sulliven's bid was adjusted to fulfill the bidding requirements, it wae $3,300 higher than the low bid.[14] On 17 September, the City Commission awarded two contracts - the Detroit Bridge and Steel Works of River Rouge, Michigen was to build the superstructure at a cost of $39,260 and the McKenzie Bridge Company of Port Huron was to build the substructure at a cost of $33,800. To pay for the project, the City of Port Huron issued $75,000 of Bridge Bonds in mid-December.[15] The superstructure fabricator was the successor to the Detroit Bridge and Iron Works, founded in 1863 in Detroit.[16] William H. McKenzie had managed or owned bridge construction firms in Port Huron between 1899 and 1912, operating under various names.[17]

Construction did not proceed on schedule in 1912, despite a promising start. In late September, McKenzie began to remove the old span. The streetcar operator had to reroute its lines over the nearby Seventh Street bridge, while McKenzie built a pontoon bridge for pedestrians just west of Military Street.[18] In removing the old center pier and the abutments, McKenzie found that the piles driven in 1884 were in such excellent condition that he could use them for the cofferdam needed for building the new abutments.[19] The 1884 swing span was gone by mid-October. Only its brass bell has survived, in Port Huron's Museum of Arts and History.[20] The local electric streetcar company pointed out that the City had forgotten to incorporate into the new bridge the needed equipment to carry the electric trolley lines, but the problem was quickly resolved.[21]

By late November, however, it was quite clear that the McKenzie Bridge Company would not come close to fulfilling the terms of its contract and have the substructure completed by December 15th, ruling out any chance that the superstructure would be complete by 15 March 1913, as originally planned. Before Thanksgiving, the City informed McKenzie's bonding company of the problem. On the eve of the mid-December deadline, McKenzie's cofferdam was leaking badly and it seemed unlikely that he would finish before March or April. The City planned to collect a $25 per day forfeit for the delay, as the contract with McKenzie specified.[22]

Prospects only worsened in January, 1913, when Osborne Engineering estimated an August completion date, with ideal weather and no additional complications.[23] In late February, however, McKenzie had to go to court to get an injunction against John H. Baer, a contractor who had threatened to remove the equipment he had leased to McKenzie, including tow pumps and a pair of pile drivers. Baer and McKenzie were in the midst of a dispute over who was liable for damage done by Baer's men and equipment.[24] McKenzie's troubles continued into the spring. In mid-April, on the eve of pouring the concrete abutments, the cofferdam failed and had to be rebuilt.[25]

In mid-April, the Mayor and City Commission issued an ultimatum to McKenzie to the effect that the City would take over the bridge project if he failed to make a serious effort to finish the work.[26] At the end of April, the City and McKenzie's bonding company agreed to pay the contractor's payroll so the work could continue.[27] Work was at a standstill again in mid-May, stymied by a leaky south cofferdam and McKenzie's lack of funds. Port Huron's downtown businessmen had lost all patience and flooded the Times-Herald and City Hall with hundreds of complaints.[28] The City issued an ultimatum to the Massachusetts Bonding Company to either help McKenzie financially or put another contractor on the project. The surety company gave McKenzie contingency funds and agreed to pay all of his bills. They were in effect expressing confidence is Bruce McKenzie, the contractor's son, who was put in charge of the project.[29]

As summer began, there was new (and false) hope for the completion of the Military Street bridge. The president of the Detroit Bridge and Steel Company, Max J.L. Towler, began announcing the immanent arrival of the steel for the bridge superstructure in late May, but no shipments reached Port Huron until the end of August.[30] Earlier in the summer, the Herald-Tribune noted that the cofferdam had been in place for such a long time that some of the piles had sprouted branches, complete with foliage.[31]

The project became further enmeshed in legal problems as the summer drew to a close. Several of McKenzie's subcontractors were attempting to sue the City of Port Huron because of McKenzie's failure to pay them. In early September, the Strauss Bascule Bridge Company won a judgement of $500 against McKenzie for unpaid bills and Strauss pressed for payment from either the City or the bonding company.[32] Additionally, the City and McKenzie had a continuing dispute over responsibility for the cost ($2,888) of repairing a city water main broken in November 1912 in the course of construction.[33]

The six main bridge girders finally arrived in Port Huron in late September and within two weeks, the Detroit Bridge and Steel Company crew, led by "Red" Hill, completed the erection of the north leaf steelwork and turned their attention to the south leaf.[34] By early November, the two leafs were finished, except for the flooring and pavement. However, they were still pointed skyward, and had to be brought to the closed position for the rest of the work to be completed. Lowering the leafs was not a simple matter, because they did not weigh enough to work properly with the concrete counterweights (160 tons per side) already in place. The solution was to temporarily add 20-30 tons of weight to the end of each leaf to safely close the bridge. The problem was further complicated by the departure of Max Towler from the Detroit Bridge and Steel Company.[35] Some ten days later, on 18 November 1913, they successfully lowered both leafs, which joined together perfectly.[36]

The City wanted to open the east sidewalk to pedestrians in late November, but Detroit Bridge and Steel objected, unless the City would assume liability for any accidents.[37] Pedestrians used the sidewalk on 1 December and a week later the streetcar tracks were completed across the new bridge.[38] The bridge company also insisted that the City Commissioners accept the bridge before opening it to traffic. They did so on 16 December and the following day, the Military Street bridge reopened to streetcar and vehicular traffic, after a closure of fourteen months.[39]

On the same day, McKenzie filed a "bill of extras" with the City, claiming that he was owed $15,003 above the original contract price.[40] In addition, the City had withheld $5,000 from him as fines for late completion of the project. The major parties involved, i.e., the City of Port Huron, McKenzie, and the Massachusetts Bonding Company, reached an out-of-court settlement in December 1914, whereby the City paid McKenzie $8,000 and the bonding company paid him an additional $1,500 to close the case.[41]

Port Huron owned this bridge until the State Highway Department assumed ownership of the bridge under a law (Public Act No. 131 of 1931) which provided State control over and responsibility for bridges on state trunklines.

The Military Street bridge had few major alterations during its lifetime. The original deck consisted of wooden paving blocks, which experienced so much unavan expansion and contraction that by the late 1940s, the two spans or "leaves" no longer met when the bridge was in the lowered position.[42] In December 1950, the State Highway Department awarded a contract in the amount of $28,580 to F.C. Atletwed to refloor the bridga. He removed the paving blocks and the timber sub-flooring, and built a concrete and steel subfloor, topped by an asphalt pavement.[43] Substantial rapairs to the abutments and pilings in 1963 cost the State of Michigan $168,586, while renovating the the operating machinery and counterweight pit walls in 1972 cost an additional $170,896. Two years later trunnion column repairs costing $58,350 were completed.[44]

The original operator's house was a timber-framed rectangular building, measuring 10' X 11', with a hipped roof, heated with a coal-burning stove.[45] The Michigan Highway Department replaced it in 1977, at a cost of $44,000, with a slightly larger (10' X 16') rectangular frame building with a pitched roof, equipped with electric heat.[46] The Great Lakes Construction Company of Warren, Michigan completed the last major renovation in 1979 at a cost of $476,000. The project included installation of steel deck grating, repair of the sidewalks, and sandblast cleaning and repairs to the steel superstructure.[47]

Other alterations to the bridge cannot be dated with certainty. Four steel trolley arches, used to support the overhead electric trolley wires and part of the original bridge, were probably removed with the trolley tracks in the early 1950s.

When built, both bridge piers were accessible through doors located below grade, one at the west end of the south abutment and the other at the east end of the north abutment. Each pier also had a set of three double-hung sash windows on both the east and west ends of the pier. The pier entrances are both extant, but the stairway leading to the south abutment is not, and the doors are not original. All the windows are covered by concrete or cinder blocks.

II. DESCRIPTION OF THE MILITARY STREET BRIDGE

The Military Street Bridge is a double-leaf bascule bridge of the Strauss trunnion type, with counterweights and the operating machinery located beneath the deck. Each leaf, with its counterweights, trunnion system, and machinery, rests on a pier connected to an abutment, all of reinforced concrete. The piers and abutments rest on timber pilings driven to bedrock. The north and south piers sre identical. The south sbutment is 67 feet 5 inches long snd 6 feet thick at its base, where it rests on the pilings, and has asymmetrical wing walls at the ends of the abutment. The west wing wsll is 12 feet 6 inches long, while the north wing wsll is 9 feet long. Both sre 10 feet thick at the pilings. The north abutment is L-shaped, with the long section, which runs along the river, measuring 76 feet 3 inches long and 6 feet thick at the pilings, while the base of the L, at the east end of the north abutment, is 49 feet 3 inches long and 10 feet thick at the pilings. Both abutments are 26 feet 3 inches in height.

The piers, which support the moving leafs, counterweights, and machinery, rest on a set of pilings distinct from those supporting the abutments. The piers, which are 14 feet from the abutments, are E-shaped, with the long side of the E facing the river, while the spsces between the short arms of the E serve as the counterweight pits. Each pier is 50 feet long, 24 feet high, and 21 feet wide along the wings that produce the E-configuration. All of the walls are 8 feet thick. The configuration results in two counterweight pits per pier, each 13 feet square and 22 feet deep.

Esch of the two bascule leafs consists of three steel girders that pivot on 15 1/2 inch diameter steel pins supported by a steel-framed trunnion post, which in turn rests on the pier. Esch girder is tied to a csst steel rack, which is linked through a pinion gear and additional trunnion connections (pivots) to an electric motor which provides the power to raise the girders and thus the bridge leaf. Near the abutment ends of the girders, the concrete counterweights hang from the girders, by way of steel trunnions connected to the girders through steel pins.

The riveted steel girders are 53 feet 9 inches long, 1 foot wide, but varied greatly in depth over their length. Each girder has a maximum depth of 7 feet at the point where the span pivots, 12 feet 6 inches from the abutment end. The girders taper to a depth of only 3 inches at the abutment end, but are 2 feet 5 inches deep at the opposite end, where the two leafs meet. The counterweights, measuring 9 feet 7 inches square and 18 feet 4 inches in height, are supported by a steel frame, which in turn is linked by the counterweight trunnion to a 7 1/2 inch diameter steel pin with its center only 3 feet 6 inches from the abutment end of the span.

Each leaf consists of three parallel steel girders, placed 13 feet apart, center to center, surmounted by a steel framework, 65 feet wide and 54 feet long, which in turn supports the roadway and sidewalks. The roadway, 40 feet wide from curb to curb, is a steel deck grating, while the sidewalks, each 12 feet 6 inches wide, are of timber construction. Each leaf is 65 feet wide and 54 feet long, producing a span 108 feet long. The north and south approach spans are each 14 feet long, resulting in a bridge 136 feet long overall. The distance between the two concrete piers is 72 feet 6 inches, but when the space taken by the timber pile "pier fenders" is taken into account, the bridge creates a 70 foot clear channel. The angle of opening for the bascule leafs is 75 degrees.

The source of motive power for the bridge is an alternating current, 60 cycle, 3 phase electric motor, drawing 220 volts and producing 25 horsepower @ 560 R.P.M., and a maximum starting torque of 306 pounds. It is equipped with a solenoid brake. The machinery is controlled electrically from the operator's house by a pair of A.C. Rheostat Controllers, made by the Westinghouse Electric Manufacturing Company of Pittsburgh, one for each leaf.

The wrought iron railings, 3 feet 2 inches high overall, consist of a lower segment 11 inches high and a distinct upper segment, 27 inches high, both with a decorative latticework design. The railings are original. No nameplate could be located on the structure.

NOTES

[1]William Lee Jenks, St. Clair County, Michigan: Its History and People (Chicago: Lewis Publishing Company, 1912), pp. 384-385 and "First Span Across Black River Built 100 Years Ago," Port Huron Times-Herald, 17 January 1933, p. 4.

[2]Ibid. and Dorothy Mitts, "Historical View of Military Street Bridge," Port Huron Times-Herald, 19 July 1984.

[3]"Memories of Old White Bridge Recalled While Present Structure is Being Wrecked," Port Huron Times-Herald, 14 October 1912, p. 1.

[4]"Black River, Its Waters, Wild and Turbulent, on Mischief Bent," Sunday Commercial (Port Huron), 12 April 1885, p. 1.

[5]Port Huron Times-Herald, 4 September 1964.

[6]"Why New Bridge Is Advised," Port Huron Times-Herald, 20 March 1912, pp. 1, 4.

[7]"Map Showing Location of Military Street Bridge and Proposed New Bridge, With Changes in Pavement, etc. For New Bridge, Feb. 1906, W.W. Phelps, City Engineer."

[8]Ibid.

[9]The best general introduction to movable bridge design is J.A.L. Waddell, Bridge Engineering, Volume I (New York: John Wiley & Sons, 1916), pp. 663-746, passim. A more detailed delineation of the various types of bascule bridge designs is given in George H. Hool and W.S. Kinne, Movable and Long-Span Steel Bridges (New York: McGraw-Hill, 1923), pp. 1-157.

[10]Charles Francis Adams, Heroes of the Golden Gate (Palo Alto, CA: Pacific Books, 1979), pp. 74-76 and John Van Der Zee, The Gate: The True Story of the Design and Construction of the Golden Gate Bridge (New York: Simon & Schuster, 1986), pp. 31-32.

[11]Hool and Kinne, Movable and Long-Span Steel Bridges, pp. 24-25 and Adams, Heroes of the Golden Gate, p. 76.

[12]Adams, Heroes of the Golden Gate, p. 78 and Van Der Zee, The Gate, pp. 32-33.

[13]Proceedings of the City Commission, City of Port Huron, Mich., For the Year Ending December 31st, 1912 (Port Huron: Riverside Printing Company, 1913), meetings of 23 April, 2 July, 9 July, 13 August, and 29 August 1912.

[14]Port Huron Times-Herald, 5 September 1912, p. 1; 6 September 1912, p. 1; and 7 September 1912, pp. 1, 4.

[15]Proceedings of the City Commission For 1912, meetings of 3 September, 17 September, and 17 December 1912.

[16]Victor C. Darnell, Directory of American Bridge-Building Companies, 1840-1900 (Washington, D.C.: Society For Industrial Archeology, 1984), p. 27.

[17]Wolverine Directory Company, Port Huron City Directory (Port Huron: Herald Publishing Company, 1900, 1904, 1907, 1910, and 1912).

[18]Port Huron Times-Herald, 23 September 1912, p. 1; 24 September 1912, p. 1; and 25 September 1912, p. 1.

[19]"Draw Will Be 70 Feet Wide," Port Huron Times-Herald, 5 November 1912, p. 5.

[20]"Old Military Street Bridge Brass Bell Back in Town," Port Huron Times-Herald, 31 May 1970, p. 1.

21"Bridge Plans to Be Altered," Port Huron Times-Herald, 8 November 1912, p. 5.

22"Can Work on New Bridge Be Completed In Specified Limit?," Port Huron Times-Herald, 20 November 1912, p. 1 and "City Will Demand $25 A Day Forfeit," Port Huron Times-Herald, 14 December 1912, p. 1.

23"Bridge Will Not Be Ready Until August," Port Huron Times-Herald, 16 January 1913, p. 1.

24"Contractor Baer is Restrained in Alleged Threats," Port Huron Times-Herald, 19 February 1913, p. 1.

25"Piles in Cofferdam Give Way Beneath Force of Current," Port Huron Times-Herald, 18 April 1913, p. 1.

26"Complete Bridge or Get Off the Job, Says Mayor to M'Kenzie," Port Huron Times-Herald, 19 April 1913, p. 1.

27Port Huron Times-Herald, 28 May 1913, p. 1 and 1 May 1913, p. 1.

28"Irate Business Men Voice Protest Over Delay on the Bridge," Port Huron Times-Herald, 15 May 1913, p. 1 and "Complete Bridge At Any Cost Is Demand Of The Businesamen," Port Huron Times-Herald, 16 May 1913, p. 1.

29"Bridge Job Is Put Up To Bonding Company," Port Huron Times-Herald, 17 May 1913, p. 1 and "M'Kenzie Is Assured Of Financial Help To Complete Bridge, Port Huron Times-Herald, 19 May 1913, p. 1.

30Port Huron Times-Herald, 20 May 1913, p. 1; 24 June 1913, p. 1; 29 July 1913, p. 1; and 23 August 1913, p. 1.

31"Cofferdam Has Begun to Sprout: Modern Version of the 'Moss Covered Bucket' Is Enacted Here," Port Huron Times-Herald, 9 July 1913, p. 1.

32Port Huron Times-Herald, 6 August 1913, p. 1; 4 September 1913, p. 1; and 8 September 1913, p. 1.

[33]"City Cleims That It Does Not Owe Money To Cont. McKenzie," Port Huron Times-Herald, 20 September 1913, p. 1.

[34]"Long Awaited Girders Arrive," Port Huron Times-Herald, 23 September 1913, p. 1 and "Bridge Assumes Tangible Form," Port Huron Times-Herald, 4 October 1913, p. 5.

[35]"Bridge Is Up, But How Will It Come Down?," Port Huron Times-Herald, 8 November 1913, p. 1.

[36]"Bridge Mechanism Is Operated With Absolute Control," Port Huron Times-Herald, 19 November 1913, p. 1.

[37]"Use of Bridge Objected To By Company," Port Huron Times-Herald, 28 Novembar 1913, p. 1.

[38]Port Huron Times-Herald, 1 December 1913, p. 1 and 6 Dacember 1913, p. 1.

[39]"Bridge Today Is Thrown Open To General Traffic," Port Huron Times-Herald, 17 December 1913, p. 1.

[40]"M'Kenzie Files Bill of Extras In Sum Of $15,000," Port Huron Times-Herald, 17 December 1913, p. 1.

[41]Proceedings of the City Commission, City of Port Huron, Mich, For the Year Ending December 31, 1914, Meeting of 7 December 1914.

[42]Port Huron Times-Herald, 23 November 1948.

[43]Port Huron Times-Herald, 4 December 1950.

[44]Bridga Maintenance Records, Michigan Depertment of Transportation, 425 West Ottawa, Lansing, Michigan.

[45]"Operator's House," Sheet No. 13 of original drawings, dated 24 Januery 1913.

[46]Port Huron Times-Herald, 9 May 1978 and Michigan Department of State Highways plans, 26 August 1976.

[47]Port Huron Times-Herald, 16 April 1979 and Michigan Department of State Highways plans, 1 August 1979.

III. SOURCES OF INFORMATION

A. Architectural Drawings: Engineering drawings, "Patented Strauss Trunnion Bascule Bridge Over Black River at Military Street, For City of Port Huron, Mich.," by the Strauss Bascule Bridge Company, Chicago. This is a complete set of drawings (13 sheets), finished in January 1913. Engineering drawings of repairs and renovations to the bridge completed in 1950, 1974, and 1979 have also survived. All are held by the Port Huron Department of Public Works, 100 McMorran Boulevard, Port Huron, Michigan 48060.

B. Historic Views: Three sources of historic views were located. The Museum of Arts and History, 1115 Sixth Street, Port Huron, Michigan 48060, has about ten views; the Port Huron Times-Herald, 911 Military Street, Port Huron, Michigan 48060, has 8-10 views, many of them copies of those found at the Museum of Arts and History; and the Port Huron Department of Public Works, 100 McMorran Boulevard, Port Huron, Michigan 48060 has two large views of construction of the bascule bridge, taken in 1912 and 1913.

C. Bibliography

1. Primary and unpublished sources:

City of Port Huron, Michigan. Proceedings of the City Commission, 1912-1914 (Port Huron: Riverside Printing Company, 1913-1915).

Port Huron Times-Herald, 1912-1970.

Sunday Commercial (Port Huron), 1885.

Wolverine Directory Company, Port Huron City Directory, 1888, 1899-1900, 1902, 1904, 1907, 1910, and 1912 (Port Huron: Herald Publishing Company).

C. Bibliography (Continued)

2. Secondary and published sources:

Adams, Charles Francis. Heroes of the Golden Gate (Palo Alto, CA: Pacific Books, 1987).

Darnell, Victor. Directory of American Bridge-Building Companies, 1840-1900 (Washington, D.C.: Society For Industrial Archeology, 1984).

Jenks, William Lee. St. Clair County, Michigan: Its History and People, 2 volumes (Chicago: Lewis Publishing Company, 1912).

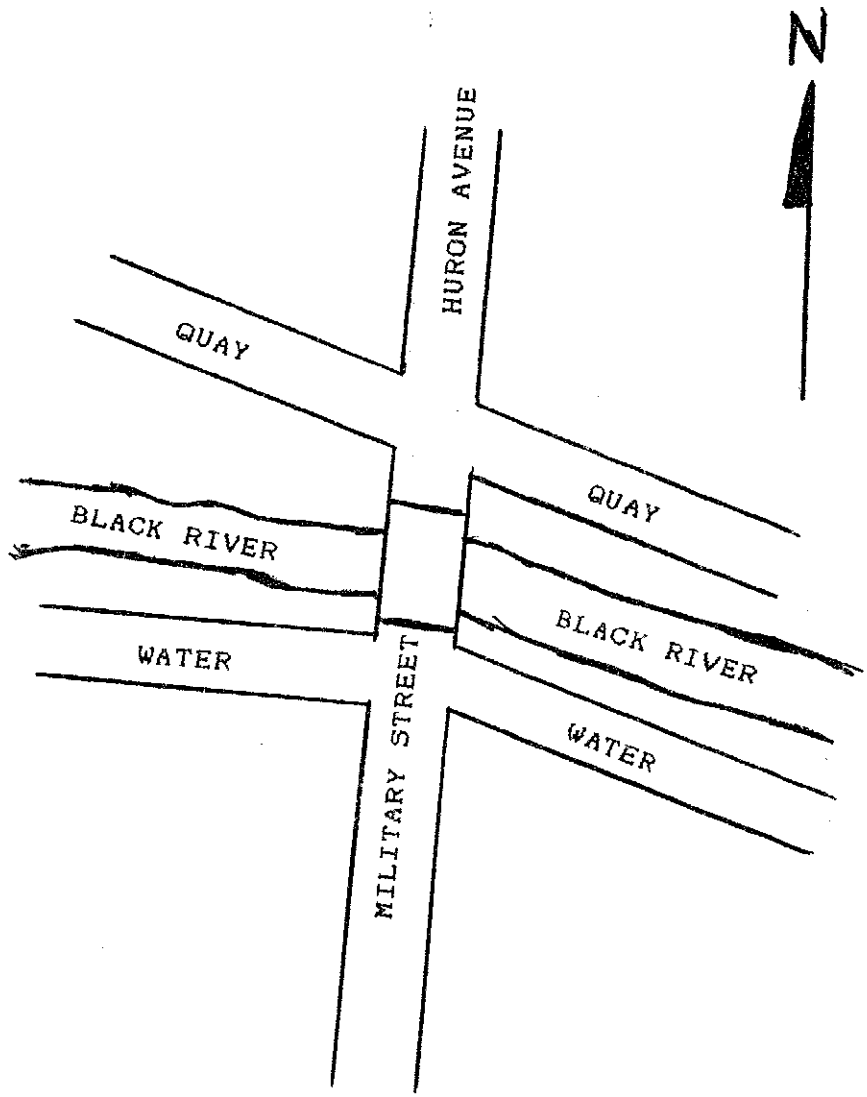
History of St. Clair County, Michigan (Chicago: A.T. Andrews and Co., 1883).

Hool, George A. and W.S. Kinne. Movable and Long-Span Steel Bridges (New York: McGraw-Hill, 1923).

Van Der Zee, John. The Gate: The True Story of the Design and Construction of the Golden Gate Bridge (New York: Simon & Schuster, 1986).

Waddell, John Alexander Low. Bridge Engineering, 2 volumes (New York: John Wiley & Sons, 1916).

MILITARY STREET BRIDGE SITE PLAN



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